

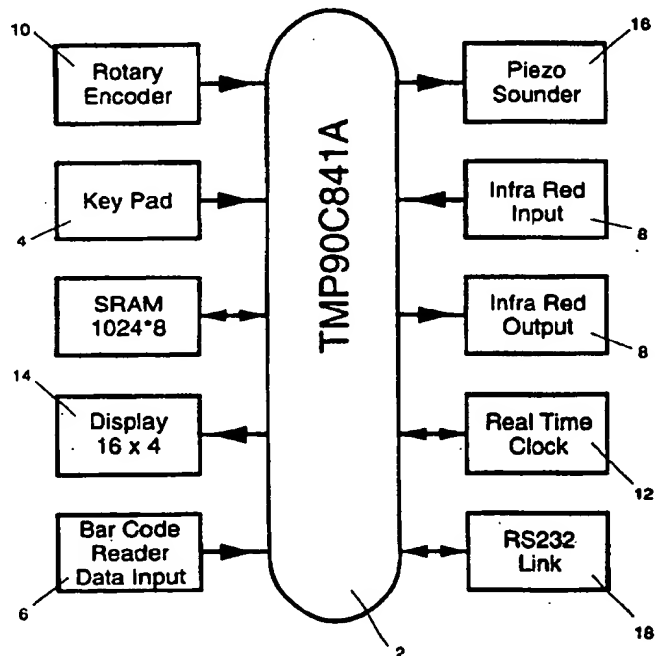
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>5</sup> :</b> <b>H04H 9/00</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 94/15417</b> <b>(43) International Publication Date:</b> <b>7 July 1994 (07.07.94)</b>
<p><b>(21) International Application Number:</b> PCT/GB93/02590</p> <p><b>(22) International Filing Date:</b> 17 December 1993 (17.12.93)</p> <p><b>(30) Priority Data:</b> 9226427.4 18 December 1992 (18.12.92) GB</p> <p><b>(71) Applicant (for all designated States except US):</b> MINIMETRICS LIMITED [GB/GB]; 300 Sandycombe Road, Kew, Richmond, Surrey TW9 3NU (GB).</p> <p><b>(72) Inventors; and</b>  <b>(75) Inventors/Applicants (for US only):</b> CORNISH, John, Wilfrid, Pym [GB/GB]; 33 Salisbury Road, Richmond, Surrey TW9 2JB (GB). FOTI, Ivan, Francis, Silvain [GB/GB]; 114 Sheen Road, Richmond, Surrey TW9 1UR (GB).</p> <p><b>(74) Agent:</b> BATCHELLOR, KIRK &amp; CO.; 2 Pear Tree Court, Farringdon Road, London EC1R 0DS (GB).</p>		<p><b>(81) Designated States:</b> AT, AU, BB, BG, BR, BY, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, US, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b>  <i>With international search report.</i></p>

**(54) Title:** MARKET RESEARCH DATA LOGGING DEVICE

**(57) Abstract**

A combined remote control and data logging unit for use as a market research tool in assessing consumer preferences with respect to television and other audio-visual entertainment sources, as well as purchasing behaviour. The device includes a microprocessor controlling the usual remote control functions, and also memory means for recording channel changes and the like so as to track the user's pattern of viewing. In addition dedicated input devices such as light pen/bar code readers may be incorporated for identifying product purchases as well as at least one rotary encoder for making menu selections or entering program appreciation ratings.



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"Market Research Data Logging Device"

This invention relates to a portable device particularly adapted for the collection of specialised types of market and media research data, and particularly, although not exclusively, television viewing behaviour and product purchasing patterns.

Various types of data collection devices for monitoring the behaviour of television viewers, and particularly their choices of television channels at various times, have previously been proposed, but generally, these are non-portable devices requiring professional installation in each unit of equipment to be monitored. Accordingly, the present invention seeks to provide a device which greatly facilitates the collection of such data, and which may also incorporate other "market research" type functions.

Accordingly, the present invention provides a programmable remote controller for audio-visual apparatus such as radio or television apparatus, incorporating means for recording the occurrence of changes of broadcast channel or frequency selected by the user or other changes of state, together with the times at which such changes take place. Preferably, means are also provided for identifying the current user or users from amongst a group of potential users, such as the individual members of a family.

In a preferred embodiment the device is able to monitor such functions as volume, unlike previous devices, which may be a useful validator. The device is economical to produce and to operate as it does not require skilled installation. It may also incorporate other "market research" type functions.

Preferably, the device also incorporates means for

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entering data relating to other aspects of consumer behaviour, such as purchasing behaviour, and for this purpose, the device may be provided with a light pen/bar code input system. It may also incorporate means for obtaining data from written answers which may be displayed and answered through a visual display.

#### Main Functions of Preferred Embodiment

The devices main function which is transparent to the user is to log all the user's viewing or listening activities - this data will then be used by the market research company. The bar-code reader enables the user to scan the bar-codes of product purchases, while the visual display enables the user to answer written questions if required by the market research company.

The device includes a remote controller which will be able to support all of the remote control functions of the user's television, and other audio video related equipment. The following equipment will be taken into consideration:

1. Television
2. Video Cassette Recorder
3. Video Disc Player
4. Teletext
5. Satellite Receiver
6. Cable Receiver
7. Audio disc/cassette player

All the equipment supported will have event timers so, for example, the video recorder can record programmes from different satellite stations consecutively while the user is out. The unit will be left in line-of-sight of the video equipment and at the programmed event times the unit will

transmit the appropriate signals.

In addition to these basic operations, the unit will also log the viewers present and viewer's appreciation of the programme being watched. Also the user(s) will be prompted by an alarm signal setup at configuration time, for viewer appreciation, if the market research company so desires.

Each unit will be individually configured by a representative of the market research company at the user's premises. The configuration is effected by a portable PC connected to the device via a serial link. In the configuration program on the PC the equipment to be controlled is selected and various options are set up. Standard equipment types and transmission signals are stored in a database on the PC, but if some of the user's equipment is not stored in the database then representatives can set up new ones. This is done by selecting a device template and assigning each key to a transmission signal learnt from the original remote control. The whole program and setup data are downloaded to the device at the end of the configuration.

#### User Interface

All functions of the unit can be activated through four main controls: an on key, an off key, an endless rotary encoder which drives a visually displayed hierarchical menu system, and an enter key. Alternatively they can be activated through the on/off keys together with a key pad. The key pad will be used for normal operation of television sets and related equipment.

#### Menus and Keys

The software consists of a hierarchy of menus. At each level in the menu hierarchy the keypad keys can be

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assigned to select menu functions, thus allowing fast menu item selection, i.e. pressing '2' to change the TV channel to 2 when in the TV menu. At each level the rotary encoder may also be used to choose the desired item and the enter key used to confirm the selection. Upon selecting an item either a sub-menu is entered or a specific action is performed, i.e. transmitting a channel change signal in the TV menu.

#### Hot-Keys

'Hot keys' allow for fast movement through the menu hierarchy, they can be specified at any level and remain active in all the sub-menus below the hot-keys specifying menu. When a hot-key is pressed the menu switched to the associated (hot-key) menu and the hot-key item is selected, for example each device supported will have a hot-key: TV, VID, SAT, Appreciation, etc so the user can switch from video recorder mode to TV mode quickly without having to use the rotary encoder, on and off keys. In addition a Top-Level-Menu hot-key is supported to take the user to the top of the menu hierarchy to allow quick selection of other (non hot-keyed) functions, e.g. Bar Code Reader.

#### Device Support

The software will be able to support a variety of remote controlled devices - televisions and video recorders being the main two. All main functions of the devices will be supported but only pre-determined functions which are relevant for market research purposes will be logged.

#### Device On/Off

Most, if not all, consumer video equipment can be

switched off and on by the remote controls. This function is supported by the device in each device menu and also in the top level menu. Normal remote controls use a single key to toggle the off/on state, but the device needs to know if a device is off or on - so two functions (Off & On) are provided in each device menu. The top level menu enables all the devices to be switched on or off simultaneously.

#### Device Events Timer

All devices have an event timer associated with them accessed via a sub-menu of the device's menu or via the top level menu. The user can set the start, stop and channel of a recording device or just the channel of a device with no recording facility. This allows, for example, the video recorder to record from two different satellite channels consecutively.

#### Miscellaneous Functions

The Market Research company will have the choice of utilising one or all of the following functions.

#### Bar Code Reader

A bar code reader will be supported and activated by entering a sub-menu of the top level menu. The bar codes of newly purchased items will be scanned by the user and the number logged. If a bar code cannot be read automatically, then the user has the ability to enter it via the key-pad.

All types of bar-code can be read, including UPC, EAN and Code 39. Data sheets consisting of questions with their answers in bar-coded form may also be used to enter additional information through the bar code reader if required.

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### Displayed Questions

A further method of entering information, if required is to show questions with a choice of pre-determined answers on the display. To do this the question sub-menu from the top level menu is entered and an answer is selected by using the rotary encoder and the enter key.

### Pre-Set Message Alarm

Message alarms can be setup, at configuration time, to sound at required dates and times. Each alarm will have an associated message appearing on the display to inform the user about the purpose of the alarm, for example, prompting the user for a viewer appreciation rating.

### Viewers Present

The device will be able to log the viewers present. This is achieved by the new viewer entering the Viewers Present sub-menu from the top level menu, selecting his/her name and pressing enter to toggle the viewing/not-viewing state.

### Viewer Appreciation

The viewer can signal his/her satisfaction or dissatisfaction with the currently viewed programme. To do this the Appreciation sub-menu from the top level menu is entered and the user's name is selected from a present viewers list. An appreciation value is entered by typing a number from 0 to 9 on the key pad or alternatively a subjective appreciation scale can be entered using the rotary encoder and the enter key.

### Television Receivers without Remote Control

If the market research company requires information on viewing of television sets or other devices



which are not operated by remote control, the manual sub-menu will be selected from the top level menu. Thus user mimics the state of the set and channel selection with the device, as if the set were remote controlled, but operates the set manually.

#### Host Connection & Configuration

The device contains only a very simple boot ROM, and the program and data are downloaded from the host PC via the serial link (or via a modem) when the device is configured. This allows for ease of software upgrading and produces greater product flexibility.

#### Program & Data

The program consists of a generic set of functions which act on and are subsequently called by the variety of data structures. Each user will have a different video equipment setup, and this is reflected in the device data structures which are downloaded at configuration time. The data structures are the top level and sub-level menus, the generic functions just traverse and operate on them.

#### Configuration

At configuration a representative will select, on the host PC (connected via the serial link to the device, the equipment devices to be supported or templates for the unsupported devices. Other configuration information will also be setup, e.g. the Alarm date, time and messages.

Once the program is downloaded, then the data structures follow. The empty device templates can be filled by 'Learning' the transmission signals of the user's existing remote controls and assigning these signals to a menu function. The learning mode is a top level menu visible at configuration, it can be de-activated by a sub-

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menu option only to be re-activated by the host PC.

#### Hardware Arrangement of Preferred Embodiment

One embodiment of the invention will now be described, by way of example, with reference to the accompanying schematic diagram.

As illustrated, the device comprises a CPU 2 which may for example be a Toshiba TMP90C840A. A number of input output devices are connected to the CPU, as shown in the drawing, notably a key pad 4, bar code reader (light pen) 6, IR transceiver 8, "appreciation input" device 10, which may for example be an endless rotary encoder, and a real time clock 12. In addition, the device includes an LCD screen 14, piezo sounder 16 and further "non-dedicated" parallel I/O ports (not shown) and serial I/O ports (18).

Each of these devices is described in more detail below.

#### Keypad (4)

The keypad has buttons to control the various operations of the device. There are 15 numeric keys whose main use is the selection of television channels. These keys are all programmable and are also used to set the date and time on the clock.

A button selects the mode of operation from Learning/clock/device. There are also dedicated buttons to cater for video and teletext functions.

The device will have the ability to distinguish which viewer or combination of viewers is using the unit and watching television. This will be accomplished by using the rotary encoder or a combination of keystrokes and then entering a number to identify the viewer before any adjustments are made to the settings of the device being controlled. The device will be able to distinguish between

at least 10 different viewers, dependent on the amount of available memory.

#### LCD Screen (14)

The LCD screen shows the current mode of the device, the channel to which the equipment is currently tuned and the date/time. It will utilise a dot matrix L.C.D. driven by the C.P.U.

#### I.R. Transceiver (8)

The receiver utilises a wide band I.R. receiver working in the 950nm wavelength region. It is used in a "learning mode" to program the device to mimic the configuration of any given TV set or peripheral for which it is to be used. Each channel of each TV set or peripheral is tuned to its correct button, so that, for example, BBC1 is always controlled by button 1. Each peripheral is then tuned using the same protocol as already established. The learning mode is then disabled once it has been programmed so as to avoid any accidental reprogramming by the user and therefore the collection of invalid data. This will be accomplished by the use of a connector plugged into an I/O port.

The receiver part of the circuit uses a broad band infrared photo diode, capable of receiving any infrared pulse. These pulses are amplified using a simple transistor amplifier which converts them into digital pulses.

When the learn mode is selected and the assignee button pressed, the C.P.U. will look for a pulse from the infrared preamp. When this pulse is received the C.P.U. activates the learning process, the received data is assigned to the active button.

The range of the transmitter will be a minimum of 3 metres. This circuit is comprised of an infrared L.E.D.

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and a simple high current surface mount transistor amplifier.

#### Appreciation Input (10)

The viewer appreciation monitor is a self-centring knob with a scale from minus x to plus x. The device can be programmed to give an audible signal when it is on which prompts the user to rate the programme that is currently being transmitted. For example it may be set to request ratings at 15 minute intervals. The user then turns the control to a positive or negative setting to represent his or her liking or disliking for material being broadcast at that time.

#### Light Pen (6)

The light pen is used to identify purchases of consumer goods which carry bar codes, but other data may be entered in this way for other types of survey. When the light pen is in use selected keys of the keyboard are disabled to avoid any spurious data being entered. The light pen can also be used to configure the device in the event that a computer is not available.

#### The Processor (2)

This will be a single chip processor such as a TMP90C840A. The processor will control all aspects of the unit from driving the display to memory management. The processor will be an 8 bit device as this allows access to more RAM for data storage and more ROM for resident software and increase speed of input output routines.

The function of the processor is to capture and store the information conveyed by the pressing of a keypad button or the use of the light pen. It will also generate and control audible signals via the sounder 16 to alert the user of the need to make an appreciation rating of a

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programme and to confirm that a button has been successfully pressed.

Each individual device has its own identification code which is stored in the processor. The processor also drives the dot matrix display of the LCD.

#### Clock (12)

The internal clock simply counts up pulses in one second units and stores this number in a memory location. Each time a button is pressed the number of one second pulses is read and stored along with the assignee button.

The real time clock displays the time on the LCD display. The clock is automatically set to the correct time each time it is connected to a personal computer. The internal pulse clock used to calculate time between button presses is also zeroed when the device is connected to a personal computer via a parallel connection (not shown).

#### Data Input/Output (18)

Data are retrieved from the memory by connecting the device to a portable lap-top computer through a serial connector. The data is then processed by specially developed software and can be prepared in various ways for statistical analysis.

In order to reduce the amount of memory used in data collection the output data consists only of number pulses between button presses and the identity of the button pressed.

The data transmission rate will be standard 9600 baud, or 9.6k per second. This means that no special communication protocol is required.

#### Power Supply (not shown)

The device will be able to work from various power

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sources including Alkaline batteries which will last approximately 10 months. The internal memory will be backed up by an internal lithium battery in order to avoid data loss if alkaline batteries become completely discharged.

#### Modem (not shown)

A modem plugs into the I/O port (18) which will allow transmission of data directly from the users home to a central computer. The modem allows the unit to be interrogated remotely, late at night for instance. In addition the modems can be used to enter changes in programs and configuration.

#### Software

The processor functions, input output, clock, memory allocation and learning will be coded in C++ and the compiled into assembler. All source code will run in terminal emulation mode.

The data capture software will also be written in C++ and the data will then be formatted for down loading onto any third party software either as text (e.g. ASCII) or numeric data.

#### Use of the Device in a Typical Application

The preferred form of device according to the invention is particularly adapted for use in market research projects. The typical procedure will be that interviewers recruit representative panels of the population that is to be investigated in a given study, which will require data on television viewing behaviour among other information.

Having obtained the co-operation of an informant, the interviewer tunes the device to the TV set and other peripherals present in the household and briefs the

informant on the use of the device. The informant then accumulates data of the types required for a particular study for a pre-determined period. At the end of this period the data are down loaded, this is done by connecting the device to a personal lap top computer via a serial link.

The data obtained from each member of the sample is then transmitted to head office where it is processed and analysed. A report is then prepared in an appropriate form. Typical objectives will be to describe the characteristics of viewers who watch certain types of television programmes and the extent to which they like or dislike each programme, or to compare the purchasing behaviour of people who have and have not been exposed to television advertising for specific products.

The display of the device may also be used to ask questions as part of a market research programme. Questions are answered by highlighting one of a number of pre-determined responses or by entering numbers. Either the personal computer or a modem may also be used to input questions into the device. In the modem case such questions would be input overnight, answered by the informant the following day and output during the following night.

Questions may relate to one of the other functions of the device or they may be independent. An example of the first type is when the device is used in the TV programme appreciation mode. In this case questions may be asked about informants' views about specific features of a given programme that they have seen. Questions on other topics may also be asked in the same way.

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## CLAIMS

1. A combined remote controller and data logging device for use with audio-visual apparatus, comprising:  
real-time clock means;  
microprocessor control means;  
user input means for entering data relating to user choices;  
signalling means, controlled by said microprocessor, for supplying control signals to cause changes of the operating condition of said audio-visual apparatus; and  
memory means for storing information relating to said choices and said changes of operating condition of said audio-visual apparatus.
2. A remote controller according to claim 1 in which said changes of operating condition include channel selections chosen by the user.
3. A remote controller according to claim 1 or claim 2 in which said user choices include program appreciation ratings.
4. A remote controller according to any preceding claim in which said user choices include consumer product preference information.
5. A remote controller according to any preceding claim in which the user input means includes a keypad.
6. A remote controller according to any preceding claim in which the user input means includes a bar code reader for reading product bar codes.



7. A remote controller according to any preceding claim in which the user input means includes a light-pen.

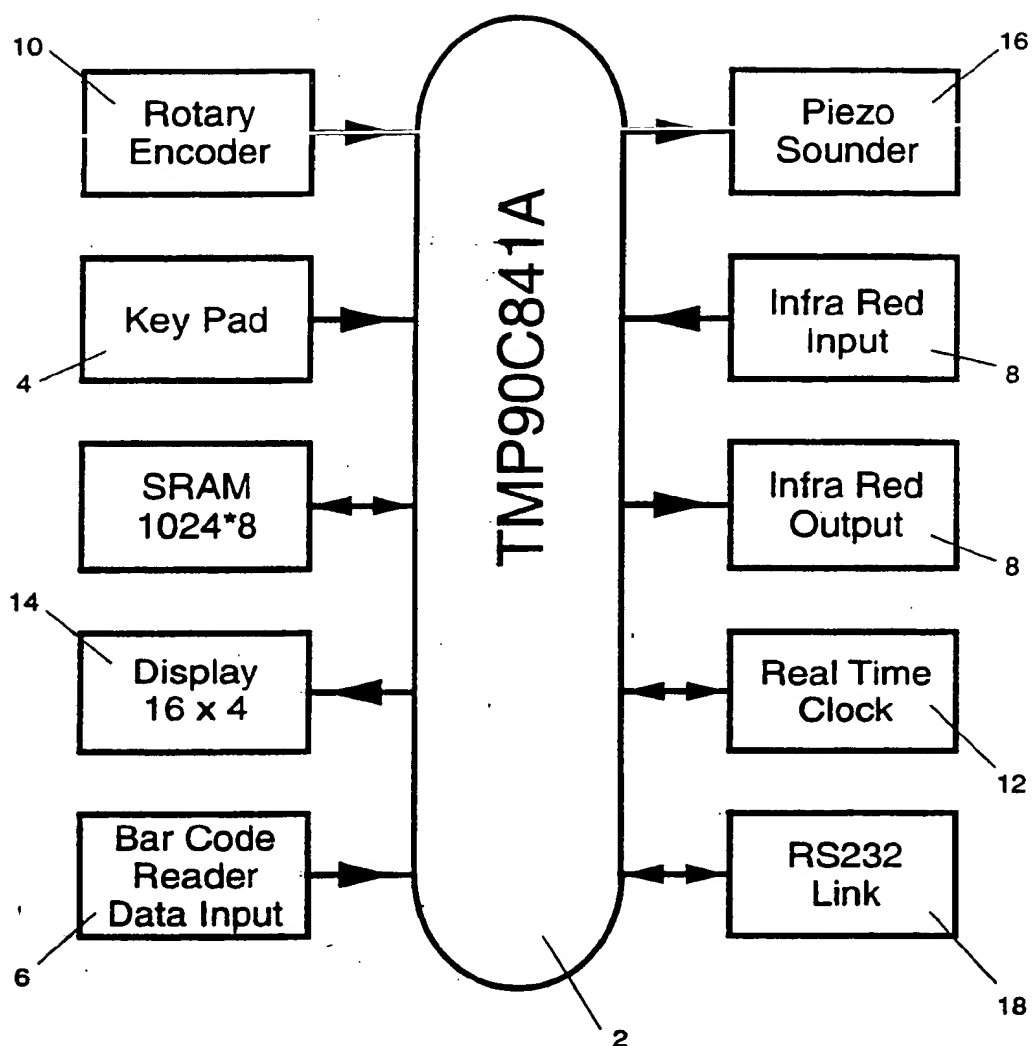
8. A remote controller according to any preceding claim further comprising a communication port for connection to an external computer, whereby the controller can be programmed by downloading a configuration program from the computer and data stored in the controller can be uploaded to the computer.

9. A remote controller according to any preceding claim further comprising display means for use in making selections to control operation of the controller.

10. A remote controller according to claim 3 further comprising a rotary encoder device for entering said program appreciation ratings.

11. A remote controller according to any preceding claim in which said signalling means comprises an infra-red transceiver.

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<b>A. CLASSIFICATION OF SUBJECT MATTER</b> <b>IPC 5 H04H9/00</b>		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) <b>IPC 5 H04H</b>		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP,A,0 328 773 (GRUNDIG E.M.V.) 23 August 1989 see column 1, line 1 - line 15; claim 1; figure 1 ---	1,6,7
A	EP,A,0 421 482 (CONTROL DATA CORPORATION) 10 April 1991 see page 3, line 1 - page 4, line 53; claims 1,3-5; figures 1,2,4 ---	1,2,4,6,7
A	EP,A,0 144 085 (ADTEL PRODUCTS INC., PEAC TECHNOLOGIES INC.) 12 June 1985 see page 4, line 21 - page 5, line 31; claims 1,3,11,19,20,25,26; figures 1,4 --- -/--	1-7
<div style="display: flex; justify-content: space-between;"> <span><input checked="" type="checkbox"/> Further documents are listed in the continuation of box C.</span> <span><input checked="" type="checkbox"/> Patent family members are listed in annex.</span> </div>		
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Date of the actual completion of the international search  <div style="text-align: center; font-weight: bold;">17 March 1994</div>		Date of mailing of the international search report  <div style="text-align: center; font-weight: bold;">30. 03. 94</div>
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016		Authorized officer  <div style="text-align: center; font-weight: bold;">De Haan, A</div>

# INTERNATIONAL SEARCH REPORT

Int. Application No

PCT/GB 93/02590

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO,A,91 18476 (CONTROL DATA CORPORATION) 28 November 1991 see page 1, line 1 - line 12; claims 1-3,14-16; figures 1,2 see page 3, line 35 - page 4, line 33 ----	1,2
A	EP,A,0 263 635 (IKEGAMI TSUSHINKI CO. LTD., VIDEO RESEARCH LTD.) 13 April 1988 see column 1, line 20 - column 4, line 18; claims 1-3,5,7,8; figure 1 -----	1-6

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